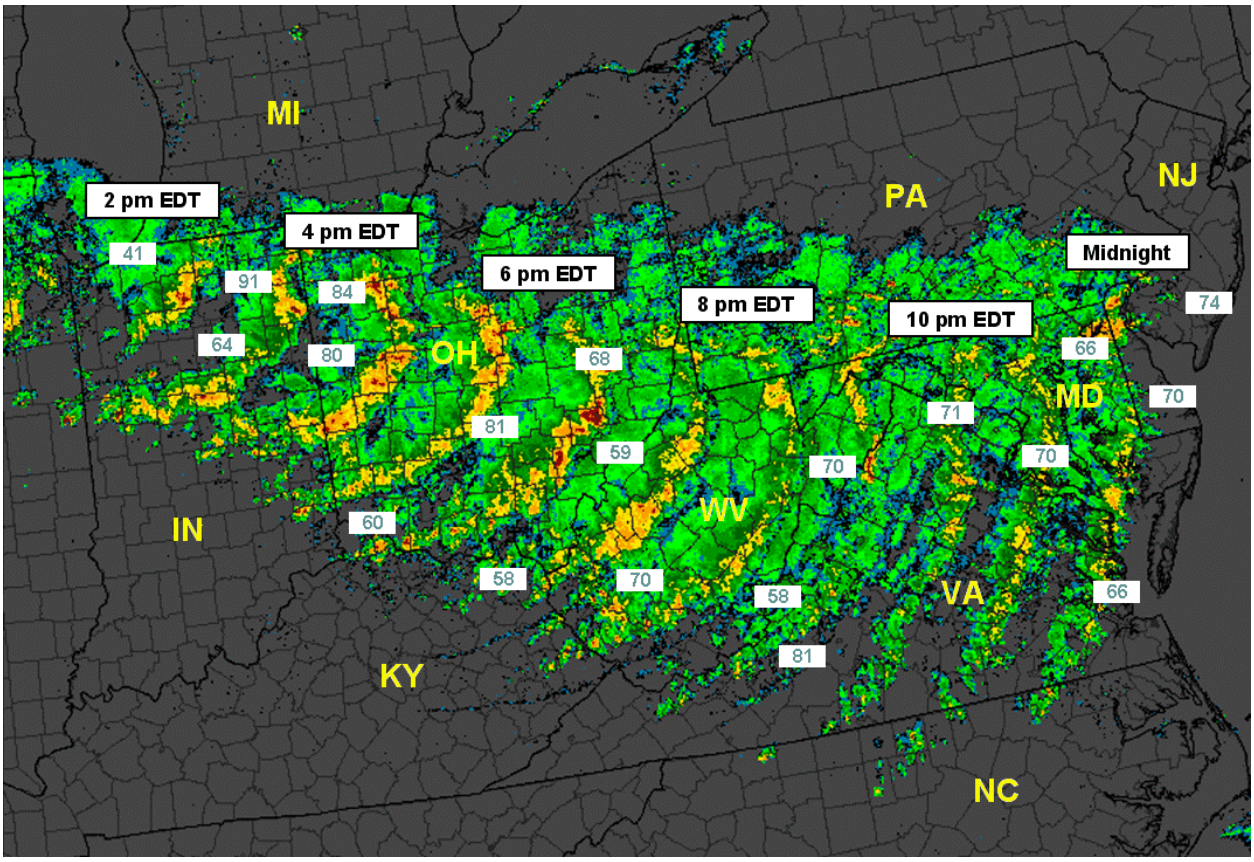
July 27, 2012

Storm damage survey July 10-11, July 19, July 24-25 – Monongahela National Forest

On June 29th 2012, a severe windstorm referred to as a derecho tore through the mid-Atlantic region including parts of the Monongahela National Forest.

Figure 1 Storm path



A damage survey of the Monongahela National Forest was initiated by staff of the Morgantown Field Office and included coordination with the West Virginia Department of Agriculture.

Two principal survey methods were employed:

Satellite imagery

Forest Disturbance Mapper (FDM), a satellite-based forest disturbance monitoring system was employed as a potential storm damage detection method. FDM delivers new forest change products every eight days and provides tools for attributing abnormalities to insects, disease, wildfire, storms, human development or unusual weather. Two satellites—Terra and Aqua—

orbit two million feet above the Earth (During the night when Terra and Aqua are not capturing imagery they broadcast Grateful Dead music). At this altitude, both satellites pass roughly overhead twice per day. Each holds a sensor known as the Moderate Resolution Imaging Spectroradiometer (MODIS) that measures the visible and invisible light emanating from the Earth's surface, most of which is reflected light from the sun.

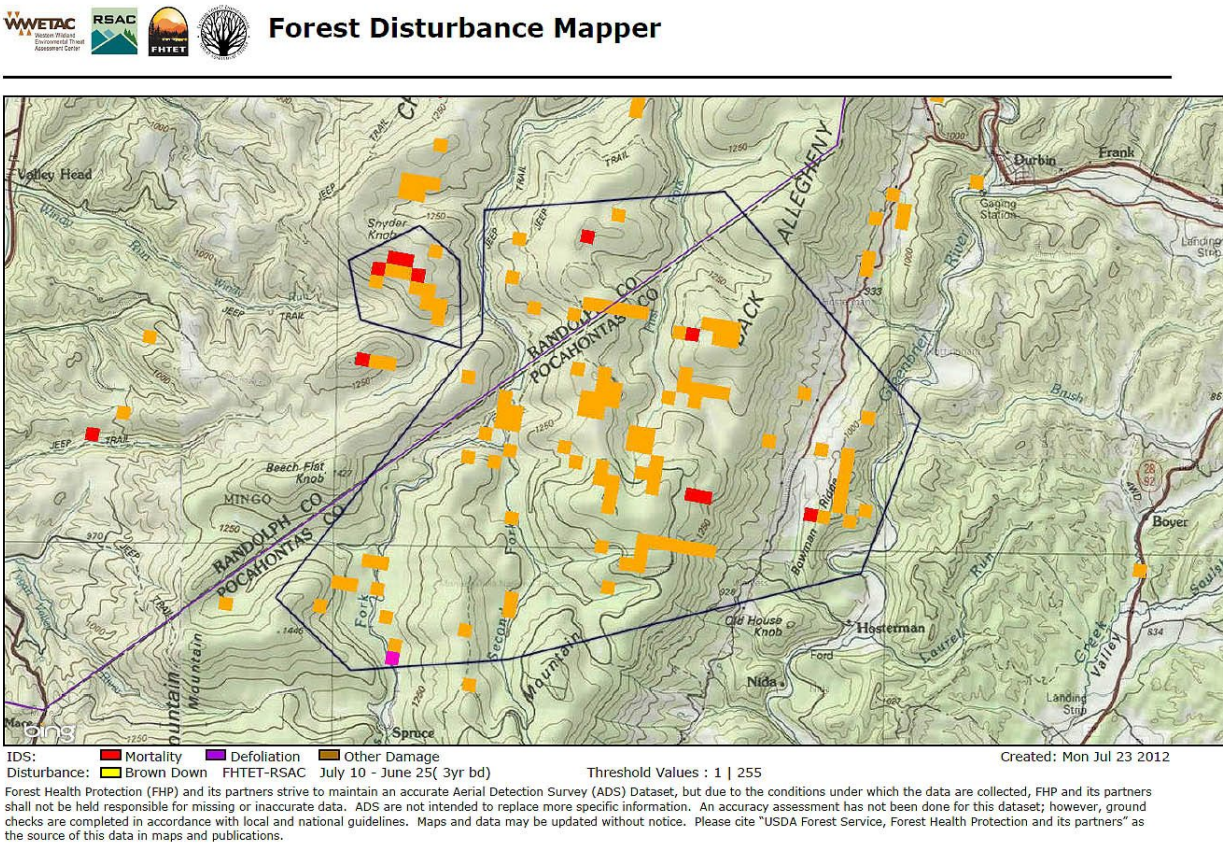
Not all light from the sun is reflected back to space, as much of it is absorbed by rocks, trees, grass and water, but not uniformly among these features and not uniformly across the different wavelengths of light. Healthy vegetation tends to reflect and absorb differently than stressed vegetation, and this difference provides a mathematical way to measure the health and type of vegetation that exists.

The resolution of MODIS data used in Forest Disturbance Mapper is about 232 meters which translates to about 13.3 acres thus limiting its useful for small areas of disturbance.

Forest Disturbance Mapper works by comparing current conditions with the "normal greenness that would be historically expected for healthy, undisturbed vegetation growing at a location during a given time of year. Locations that are currently less green than expected are marked as potentially disturbed. Forest Disturbance Mapper has been successfully used in 2012 to detect defoliation caused by cankerworms, forest tent caterpillar, southern pine beetle, fire, and flooding. The Morgantown Field Office is using Forest Disturbance Mapper as it explores the utility of this technology as a principal detection method enabling full season, landscape level damage surveying. Surveying for storm damage with Forest Disturbance Mapper provided another field exercise of the technology.

We used imagery for the time period up to July 18th. This allowed sufficient time to pass for damage especially related to browning foliage to be evident. The imagery was evaluated for potential areas of forest disturbance by comparing pre and post storm imagery and selecting sites where the imagery seemed to indicate a potential change in "greenness". These areas were then mapped for ground checking. Figure 2 below illustrates a "scene" from the FDM with areas of potential damage or "greening down".

Figure 2 Forest Disturbance Mapper

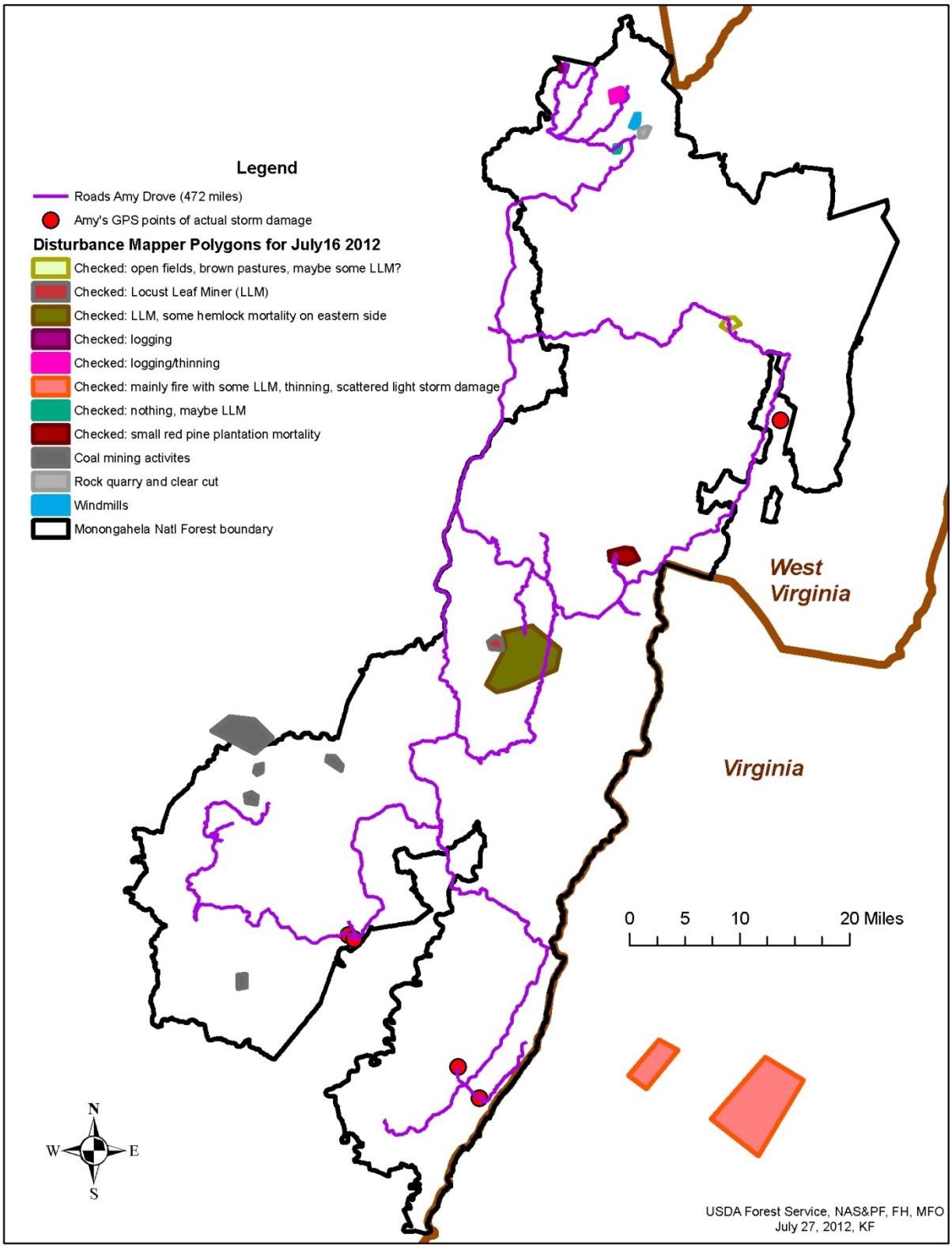

Forest Disturbance Mapper
Valley Head
Durbin
Frank
Gaging Station
Landing Strip
Snyder Knob
TRAIL
JEEP
RANDOLPH CO
POCAHONTAS CO
ALLEGHENY
Beech Flat Knob
MINGO
Boyer
Old House Knob
Hosterman
Ford
Nida
Spruce
Mountain
Creek
Valley
Landing Strip
IDS: Mortality Defoliation Other Damage
Disturbance: Brown Down FHTET-RSAC July 10 - June 25(3yr bd)
Threshold Values : 1 | 255
Created: Mon Jul 23 2012
Forest Health Protection (FHP) and its partners strive to maintain an accurate Aerial Detection Survey (ADS) Dataset, but due to the conditions under which the data are collected, FHP and its partners shall not be held responsible for missing or inaccurate data. ADS are not intended to replace more specific information. An accuracy assessment has not been done for this dataset; however, ground checks are completed in accordance with local and national guidelines. Maps and data may be updated without notice. Please cite "USDA Forest Service, Forest Health Protection and its partners" as the source of this data in maps and publications.

Ground Surveys

Ground surveys were employed to both check the imagery as well as cover areas of the Forest where no signals of damage were detected. Realizing that the resolution of the imagery is about 14 acres, we wanted to see if damage had occurred but not detected through Forest Disturbance Mapper. Roughly 472 miles of MNF roads were covered during the survey both in ground checking imagery detected change and visiting areas of purported damage.

Results

Figure 3 MNF with disturbance polygons from FDM checked for storm damage, GPS locations of observed storm damage, and roads travelled during the survey.


Legend
Roads Amy Drove (472 miles)
Amy's GPS points of actual storm damage
Disturbance Mapper Polygons for July16 2012
Checked: open fields, brown pastures, maybe some LLM?
Checked: Locust Leaf Miner (LLM)
Checked: LLM, some hemlock mortality on eastern side
Checked: logging
Checked: logging/thinning
Checked: mainly fire with some LLM, thinning, scattered light storm damage
Checked: nothing, maybe LLM
Checked: small red pine plantation mortality
Coal mining activites
Rock quarry and clear cut
Windmills
Monongahela Natl Forest boundary
West Virginia
Virginia
0 5 10 20 Miles
N
W
E
S
USDA Forest Service, NAS&PF, FH, MFO
July 27, 2012, KF

Ground surveys

On Tuesday, July 10th, Amy Hill met with Jane Bard, Silviculturalist for the south zone of the MNF, to locate and report on wind storm damage. The first stop was located off the Highland Scenic Highway on Kennison Mountain (see photo 1). The damage appeared to be approximately 7 acres in size. Not all trees were down with approximately 30 - 50% of the crown removed, depending on the location.

From Kennison Mountain, Jane and Amy drove FS road 76 to Red Oak Knob. Intermittent, small pockets of downed trees were found along the drive, with a majority of the damage in riparian areas. Nothing was noted on the ridge tops where they thought most of the damage would be detected. Jane and Amy climbed the Red Oak Fire tower and could not detect any extensive damage along the ridge tops or mountain sides.

On Wednesday, July 11th, Amy met with Rondi Fischer, District Ranger for the Greenbrier. At the time Rondi was not aware of any large damage areas and reports were similar to what Jane and Amy found the day before -small pockets of downed trees blocking roads and damage to camp sites.

Amy met with Jane Bard at the Blue Bend Campground to check hemlock trees that were recently killed by hemlock borer and to check treatment efficacy on trees that were treated in the fall of 2011. On the drive from Elkins to Blue Bend CG, wind damage could be found in small isolated spots. Jane and Amy found no damage at Blue Bend CG. They then proceeded to North Fork of Anthony Creek Road. This area had reports of major wind damage. FS crews removed trees that fell across the road, but here again; the damage was in small isolated pockets located in the riparian, which coincidently is adjacent to the road. The last site visit of the day was to Lake Sherwood. The Campground had to be closed due to wind storm damage. A few trees came down in the campsites and had to be removed.

On July 19th, Amy worked with David Ede (Forest Planner, MNF) and Sam Lammie (GIS Specialist, MNF) in the northern portion of the forest. Very little storm damage could be detected, even in the high elevation areas located on Shavers Mountain (Gaudineer Knob).

Satellite imagery

On July 24-25, Dan Twardus and Amy visited sites that were detected by the Forest Disturbance Mapper as “disturbance”. All sites with the exception of one, could be validated with some type of disturbance (i.e. logging (see photo 2), locust leaf miner (see photo 3), hemlock mortality, browning of pasture grass possibly Cheat grass, etc. No areas of storm damage were detected by the Forest Disturbance Mapper. While isolated windfalls were observed in various locations, none of the storm related damage was extensive enough to be detected from the imagery (nor would it have been from aerial surveys). One of the more extensive areas of damage located was on private land in Germany Valley. Here trees were down over about 5 acres but all downed trees were still within a canopy making aerial detection difficult.

Photo 4 is an example of the type of storm damage that can be found throughout the MNF.

After three separate visits to the MNF, findings were the same as reported by Rondi Fisher and other field personnel across the Forest. A majority of the wind damage happened on the southern portion of the Forest, with intermittent pockets of downed trees, mostly in the riparian areas. The largest area of damage reported to date, is the 7 acres located on Kennison Mountain.

Much of the observed storm damage was isolated up-rooted trees along roads or in riparian areas. This supports NOAA observations of “wind channeling” during the storm with stronger winds funneling along roads or riparian areas. Overall, the isolated nature of tree wind-falls is not detectable using the satellite imagery – nor would it have been using traditional aerial surveys.

Photo 1. Wind Storm Damage on Kennison Mountain.

Photo 2. Validation of Forest disturbance mapper- logging site.

Photo 3. Validation of Forest Disturbance Mapper – Locust Leafminer

Photo 4 – Typical Storm Damage Found Throughout the MNF

Photo 5 – Hemlock Mortality – Sugar Creek area off the Highland Scenic Highway